Machine Learning for Aeronautics

The National Airspace (NAS) has many elements (aircraft, airports, airspace divided into multiple regions and sectors) with multiple competing objectives (e.g., safety, throughput, minimum fuel use and pollution). The substantial and heterogeneous datasets from these elements represent the operations of the entire system. We must use these datasets to learn the emergent behavior at different levels of the system---especially situations in which every element is doing its job but the different elements end up working at cross-purposes. With the anticipated increases in utilization of the NAS, we need to monitor the system to identify previously unknown anomalies and precursors to potentially damaging incidents and accidents. These anomalies and precursors must be communicated to the appropriate people within the NAS in a timely manner to allow sufficient time to apply mitigations. By learning from the uses of these mitigations and their effects, we can even produce decision support systems that can advise the appropriate people on the best mitigations to perform. The ultimate desire is to manage the NAS in the best way possible using a combination of humans and autonomous systems that continuously learn and complement each other with their different skill sets.

In this session we will explore what has been done and make plans for what needs to be done to use machine learning to improve safety, efficiency, and other key metrics in aeronautics.